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INTRATEST AND INTERTEST MEANS AND RELIABILITY OF THE MMPI–168 FOR UNIVERSITY STUDENTS AND PATIENTS REFERRED FOR NEUROPSYCHOLOGICAL ASSESSMENT[1]

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Summary.—68 first-year university students and 37 patients, after a 1-mo. or a 2-yr. interval, respectively, were re-administered the MMPI–168 (the first 168 items of the Minnesota Multiphasic Personality Inventory). The mean of the test-retest correlation coefficients between the first and second administrations for the 13 scales (3 validity, 10 clinical) was about .62 for the students and the patients. The mean absolute change in standardized scores for the scales between the two administrations for both groups was only 0.2 of a standard deviation. Compared to the students, however, the patients who had been referred for neuropsychological assessments displayed elevated (>2 *SD*) mean scores for several of the scales during both administrations. These results indicate that the MMPI–168 profiles of the patients did not change appreciably even though several years had elapsed since the injuries. The correlation coefficients between means of the scaled scores between the first and second administrations for the students and patients were .91 and .95, respectively.

Psychologists' accuracies when inferring differences between populations with different reinforcement histories and in discerning the reliability of the respondents' patterns of responses over time are strongly influenced by the characteristics of the psychometric tool. Prorated scores to derive standardized (*T*) scores for three validity scales and 10 clinical scales from the first 168 items of the Minnesota Multiphasic Personality Inventory (MMPI–168) have been derived from longer versions by Vincent, Castillo, Hauser, Zapata, Stuart, Cohn, and O'Shanick (1984). One of the advantages of smaller numbers of items within a test is that other tests, with different psychometric assumptions, can then also be given during the limited periods available to assess patients.

Tiller and Persinger (1998) employed the MMPI–168 as one of the many tests within our neuropsychological assessments for patients who have sustained impacts of mechanical energies to their bodies to discern the psychometric profiles for concepts derived from psychiatric nosology. The first author has also employed the MMPI–168 in first-year university courses so that students could learn to evaluate the significance and limitations of their own MMPI profiles. Some researchers, for example, Dingemans and Wekking (1996) have reported that the scores for Sc (schizophrenia) within the

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MMPI–168 are more elevated than the scores obtained from either the complete (566 items) or the abridged (399 items) versions of the MMPI.

The present study was designed to discern the intratest and intertest reliability of the MMPI–168 for a sample of university men and women, analyzed separately, enrolled in a first-year psychology course. As well, we decided to examine the intertest reliability and means of these scores for patients after about two years had elapsed since the first measurement and to compare these scores with those from the university students.

Method

Subjects

A total of 68 university students (31 men and 37 women) who were enrolled in a first-year psychology class and 37 patients (20 men, 17 women) who had been referred by either attorneys or by rehabilitation companies for neuropsychological assessments after ($M = 1.7$ yr., $SD = 2.3$ yr.; range = 0.2 to 10 yr.) impacts of significant mechanical energies to their bodies. The means and standard deviations for the ages of the students and patients were 21.5 ($SD = 6.3$) yr., and 35.2 ($SD = 11.9$) yr., respectively. The median ages for the two populations were 19 yr. and 33 yr., respectively.

Procedure

For the university students the MMPI–399 was administered during the last hour of a 3-hr. weekly evening lecture during the month of February. One month later the students were again asked to complete the first 168 items of the MMPI during the third hour of a weekly lecture. For the patients, the first 168 items were read to each one individually during the last hour of an 8-hr. testing period during the first two days of an assessment or during the afternoon of the second day of the assessment.

For the university students paired t tests were completed for the T scores obtained for the three validity scales and the 10 clinical scales from the raw scores derived from the first 168 items as well as the 399 items for the first administration. In addition paired t tests for the T scores for each of the scales were completed for the first and second administrations (separated by 1 mo.) of the MMPI–168. For the patients, paired t tests were completed for the T scores for the scales from the MMPI–168 for the first and second administrations. The mean and standard deviation for the time between the two tests were 2.0 and 1.2 yr., respectively.

To estimate internal consistency, a type of within-group replication, the men and women were analyzed separately and compared. To examine the variation of individual scores, the differences for each individual between the T scores on each scale for the two administrations were calculated. The means and standard deviations for these values were obtained. One-way anal-

yses of variance were conducted for the differences between the students and patients for each of the scales. Considering the sample size and the numbers of measurements, only probability values of less than .01 were accepted as significant statistically. All analysis involved SPSS software on a VAX 2000 computer.

Results

The means and standard deviations for the T scores for the 13 scales from the MMPI for the first administration of the MMPI–168, the complete MMPI (399 items) from the same administration and for a second administration of the MMPI–168 1 mo. later for the university men and women are shown in Tables 1 and 2. The only statistically significant ($p < .01$) within-test differences (168 vs 399) were for the D ($t = 4.40$) and Si ($t = 2.78$) scales for the men (all dfs = 30) and for the L ($t = 5.69$), D ($t = 4.27$), Pa ($t = 3.14$), and Si ($t = 2.85$) scales for the women (all dfs = 36).

TABLE 1
Means and Standard Deviations For T Scores on Scales From MMPI–168, MMPI–399 of Same Form and For a Second MMPI–168 Given Two Weeks Later For Men ($n = 31$) With Intratest and Intertest Correlations

Scale	MMPI–168		MMPI–399		r	Second MMPI–168		
	M	SD	M	SD		M	SD	r
L	48	6	47	6	.68	47	6	.67
F	62	9	62	9	.53	62	8	.35
K	48	8	51	8	.48	46	9	.60
Hs	56[a]	12	57	12	.72	51[b]	10	.68
D	66[a]	14	58[b]	13	.68	60[b]	12	.64
Hy	58	9	56	9	.48	54	6	.44
Pd	57	9	60	8	.43	55	7	.33
M/F	57	12	56	10	.57	54	11	.70
Pa	53	7	53	7	.31	52	7	.34
Pt	60[a]	14	63	13	.67	55[b]	13	.50
Sc	65	16	68	14	.54	61	13	.37
Ma	63	12	69	11	.25	65	13	.46
Si	54[a]	12	59[b]	7	.64	53	10	.62

[a] vs [b] $p < .01$; $r > .50$, $p < .001$.

For the test-retest data, the university men displayed significantly decreased (all dfs = 30) scores for Hs ($t = 3.18$) and D ($t = 3.26$) during the second administration compared to the first, while the women displayed significantly (all dfs = 36) lower scores for L ($t = 3.12$), K ($t = 3.56$), Hy ($t = 2.84$), and Pt ($t = 3.14$) 1 mo. after the first administration. For the patients (dfs = 36), a significant decrease was noted only for the Pt scale ($t = 2.87$). As a population, the patients displayed significantly ($p < .001$) higher scores (ω^2 estimates in parentheses) on the following scales L (18%), F (15%), Hs (28%), D (27%), Hy (30%), Pd (16%), Pt (21%), and Si (10%).

TABLE 2
MEANS AND STANDARD DEVIATIONS FOR *T* SCORES ON SCALES FROM MMPI–168, MMPI–399 OF SAME FORM AND FOR A SECOND MMPI–168 GIVEN TWO WEEKS LATER FOR WOMEN ($n = 37$) WITH INTRATEST AND INTERTEST CORRELATIONS

Scale	MMPI–168		MMPI–399		*r*	Second MMPI–168		
	M	*SD*	*M*	*SD*		*M*	*SD*	*r*
L	47[a]	8	43[b]	5	.60	45[b]	6	.66
F	60	8	57	8	.67	60	8	.72
K	51	8	53	7	.55	48	8	.77
Hs	53	8	54	9	.64	50	9	.71
D	58[a]	11	53[b]	11	.81	56	12	.82
Hy	55[a]	7	55	8	.60	52[b]	8	.69
Pd	57	9	59	10	.62	54	9	.67
M/F	52	11	52	10	.69	54	10	.80
Pa	60[a]	10	54[b]	9	.47	58	9	.56
Pt	54[a]	11	55	9	.46	50[b]	10	.70
Sc	58	9	59	9	.54	56	8	.58
Ma	62	12	62	10	.71	64	10	.69
Si	53[a]	10	57[b]	7	.33	54	9	.66

[a] vs [b] $p < .01$.

The percentages of university students (men and women combined) who displayed changes in scores (differences between the second and first administrations for each scale for each subject) of within ± 1 *SD* (10 *T* units) between the first and second administrations were L 95%, F 90%, K 90%, Hs 77%, D 75%, Hy 85%, Pd 84%, MF 84%, Pa 81%, Pt 69%, Sc 69%, Ma 74%, and Si 84%. The percentages of patients who displayed changes in scores within ± 1 *SD* for these scales were 81%, 70%, 76%, 67%, 54%, 79%, 63%, 79%, 65%, 63%, 57%, 51%, and 70%, respectively.

The scattergram for the correlation between the first and the second administrations of the MMPI–168 for the men and women from the populations of university students and for the patients is shown in Fig. 1. The correlation coefficients (r) for the two populations were .91 and .95, respectively. The slopes and the standard errors of the slopes for the second and the first administrations of the MMPI–168 for the students and patients were .96 ($SE = .09$) and .84 ($SE = .06$), respectively.

Separate analyses were completed between the means and standard deviations for the first and the second administrations of each scale for the men and women from the university and patient populations ($n = 52$ scores) with the strength of the correlation coefficients for each scale (Table 3). There were no statistically significant correlations ($r < .10$) between the magnitude of the test-retest correlations and either the magnitude of the means or standard deviations of the *T* scores for patients or students. The mean test-retest correlation for the university students ($r = .61$) and patients ($r =$

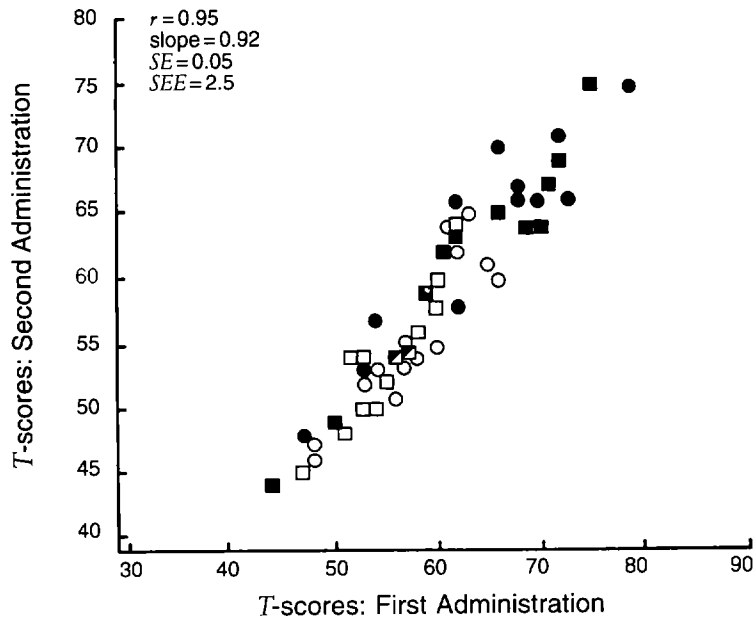

FIG. 1. Scattergram of the relationship between the T scores for the 13 scales of the MMPI–168 for the populations of male (●) and female (■) patients and male (o) and female (□) university students. *SE* refers to the standard error of the slope while *SEE* refers to the standard error of the estimate for the regression equation of the correlation.

.62) did not differ significantly ($F_{1,50} = .10$, $p > .05$) even though the patients averaged significantly higher *T* scores than the students ($F_{1,50} = 13.10$, 18.95, $p < .001$) for the first administration ($M = 64$, $SD = 9$ vs $M = 56$, $SD = 5$) and the second administration ($M = 63$, $SD = 8$ and $M = 55$, $SD = 5$), respectively.

DISCUSSION

The present results showed that the maximum differences in the means of the *T* scores derived from the first 168 items of the MMPI or the 399 items of this test were about 0.2 *SD* for the university students. University men's scores on the Depression and Social Introversion scales were mildly elevated for the 168 version compared to the 399 pattern. The university women's *T* scores for the Lie, Depression, Paranoia, and Social Introversion scales were elevated for the 168 version relative to the 399 pattern.

This result did not support the observations by Dingemans and Wekking (1996) who found an elevation of the mean *T* score for the Schizophrenia scale for the MMPI–168 compared to the longer version of this inventory. The intratest correlation coefficients for both the men and women enrolled in the first-year psychology course ranged between .31 and .81. This

TABLE 3

MEANS AND STANDARD DEVIATIONS FOR *T* SCORES ON SCALES FROM FIRST AND SECOND ADMINISTRATIONS (2 YEARS LATER) OF MMPI–168 FOR 20 MEN AND 16 WOMEN ($N = 36$) REFERRED FOR NEUROPSYCHOLOGICAL ASSESSMENTS WITH INTRATEST AND INTERTEST CORRELATIONS FOR ALL AND FOR MEN (r_m) AND WOMEN (r_w) SEPARATELY PLUS MEANS AND STANDARD DEVIATIONS OF AVERAGE OF INDIVIDUAL DIFFERENCES FOR PATIENTS AND STUDENTS

Scale	Administration				r	r_m	r_w	Individual Differences			
	First		Second					Patient		Student	
	M	*SD*	*M*	*SD*				*M*	*SD*	*M*	*SD*
L	54	13	53	10	.76	.60	.91	–1	7	–1	5
F	69	13	68	15	.73	.82	.49	–1	10	0	8
K	48	9	48	8	.50	.50	.72	0	8	–2	7
Hs	70	15	67	17	.73	.74	.76	–3	12	–4	8
D	77	16	75	19	.58	.67	.41	–2	15	–4	9
Hy	70	13	67	12	.67	.62	.75	–2	10	–3	7
Pd	67	14	66	12	.59	.65	.47	–1	12	–3	8
MF	50	11	51	12	.64	.52	.57	2	10	0	8
Pa	61	14	64	16	.57	.58	.58	3	13	–2	10
Pt	71[a]	16	65[b]	16	.71	.69	.77	–6	12	–5	11
Sc	62	14	64	21	.70	.73	.61	3	16	–3	13
Ma	68	12	67	13	.37	.43	.43	0	14	2	11
Si	61	11	59	10	.68	.77	.62	–2	9	0	9

[a] vs [b] $p < .01$; $r > .50$, $p < .001$.

range is larger, and the mean values are smaller than the correlations between .70 and .90 reported by Dingemans and Wekking (1996). Whether these differences in intertest correlations reflect sample differences, cultural variations, or the difference between severity of psychiatric conditions remains to be determined.

The test-retest correlations after one month for the responses on the MMPI–168 ranged from .32 to .82. The mean of the 13 test-retest correlation coefficients was significantly higher ($F_{1,24} = 16.21$, $p < .001$; $\omega^2 = 40\%$) for the university women ($M = .70$) compared to the mean of the university men ($M = .52$). This averaged sex difference for the strength of the test-retest correlations was not apparent for the sample of patients.

A particularly striking result was the similar magnitudes of the average test-retest correlations for the university students and the patients. The averaged value was about .61 for both groups. This marked congruence of magnitudes for the correlation coefficients suggests that, despite either 1 mo (the students) or 2 yr. (the patients) between the tests, the respondents' responses to items that composed the various clusters were similar. However, this does not imply that the respondents were endorsing the same items but rather that the means of the total items for the same scales remained consistent.

From the perspective of change in psychometric profiles following mechanical impacts of energy to the body, the presence of a weak but statisti-

cally significant decrease in only one test, Psychasthenia (ruminative anxiety), is important. Even though, on average, two years had elapsed between testing, there were no major changes in the scaled scores for the patients. Their values for the scales L, F, Hs, D, Pd, Pt, and Si were significantly elevated compared to those of the students. The effect sizes for the group (students vs patients) differences for the scales Hy, D, and Hs were about 25%. The maximum difference between the means of the scaled scores was about 2 *SD*s.

Consequently, the absence of a marked change, even after 2 yr., indicates that the patients who had been referred for suspected closed-head injuries following a significant impact of mechanical energy to their bodies were still, as a group, reporting difficulties with adaptation. During this period most of the interventions and treatments to accommodate the patients' difficulties had been given. Unless one assumes that individuals with this profile are *a priori* more likely to have mechanical impacts to the body or as a group are more likely to display behaviours that result in referrals, one could conclude that the consequences of mechanical impacts are persistent for years.

This study was a correlational and not an experimental design. Because we did not randomly allocate the subjects to the conditions that would have resulted in the injuries for our group of patients and we had no measures for the patients before the impact of the significant mechanical energy, their clinical scores cannot be attributed with absolute certainty to either the mechanical impacts or to the subsequent changes in reinforcement schedules. Subotnik, Neuchterlein, and Green (1999) showed that the scales Hs, D, Hy, Pd, and Pt may be indicators of vulnerability to periods of distress sufficient to require hospitalization. From this perspective patients who were referred for assessment may have displayed a stable vulnerability that was not sufficient to affect their adaptability until the disruptive incident occurred.

The consistency of the mean over time for all of the scales was indicated in Fig. 1. Because each of these means was based on the means of about 30 students or patients, the strong correlation of .95 and the slope of .92 indicate the marked consistency of both the relative and absolute values of the scores for the scales between the first and second administrations. The strengths reiterate the observation that population characteristics of psychometric tests can remain consistently robust while individual variations contribute to most of the unexplained variance.

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